

# PATENT ABSTRACTS OF JAPAN

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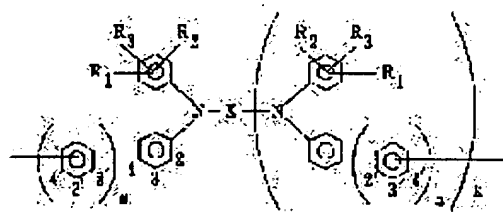
SEKI MIEKO

## (54) CHARGE-TRANSFER POLYESTER AND ORGANIC ELECTRONIC DEVICE PRODUCED BY USING THE POLYESTER

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a charge-transfer polyester having high performance, producible easily and useful as an electrophotographic receptor by including respectively specific dicarboxylic acid component and diol component as partial structures.

SOLUTION: The objective polyester contains (A) at least one kind of structure expressed by CO-(T)a-A-(T)a-CO as a dicarboxylic acid component and (B) at least one kind of structure expressed by O-(T)b-A'-(T)b-O {A and A' are each a bivalent group of formula [R<sub>1</sub> to R<sub>3</sub> are each H, a halogen, an alkyl or the like; X is a (substituted)bivalent organic group; (a), (b), (k) and (m) are each 0 or 1; T is a 1-10C bivalent hydrocarbon group]} as partial structure of each repeating unit. The above polyester preferably has a weight-average molecular weight of 10,000-300,000.



## LEGAL STATUS

[Date of request for examination]	24.09.2002
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CLAIMS

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## [Claim(s)]

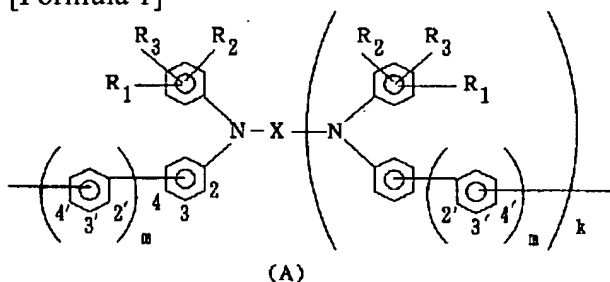
[Claim 1] Charge transportability polyester characterized by containing at least one or more sorts of the structure expressed with the following general formula (II) as at least one or more sorts and diol component of the structure expressed with the following general formula (I) as a dicarboxylic acid component as a substructure of a repeat unit, respectively.

-CO-(T)a-A-(T)a-CO- (I)

-O-(T)b-A'-(T)b-O- (II)

A and A' shows among [type the radical of bivalence shown by the following formula, respectively.

[Formula 1]



(R1, R2, and R3 show independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, an alkyl group, an alkoxy group, a permutation, or ], respectively, and X shows the divalent organic radical which is not permuted [ a permutation or ].) a, b, k, and m show the integer of 0 or 1, respectively, and T shows the divalent hydrocarbon group into which carbon numbers 1-10 may branch.]

[Claim 2] Charge transportability polyester according to claim 1 whose weight average molecular weight is 10,000-300,000.

[Claim 3] Charge transportability polyester according to claim 1 characterized by consisting only of structure expressed with the above-mentioned general formula (I) as a dicarboxylic acid component, and structure expressed with the above-mentioned general formula (II) as a diol component.

[Claim 4] Charge transportability polyester according to claim 1 characterized by Radical X being a biphenylene radical, 3, and 3'-dimethyl biphenylene radical or a terphenylene radical.

[Claim 5] The organic electron device characterized by containing charge transportability polyester according to claim 1 to 4 in the charge transportation functional film.

[Claim 6] The organic electron device according to claim 5 characterized by an organic electron device consisting of an electrophotography photo conductor which has a sensitization layer.

[Claim 7] The organic electron device according to claim 5 characterized by containing charge transportability polyester according to claim 1 to 4 in the surface layer of an electrophotography photo conductor.

[Claim 8] The organic electron device according to claim 5 to 7 characterized by for an organic electron device consisting of an electrophotography photo conductor which has a sensitization layer, and

containing a gallium halide phthalocyanine crystal, a halogenation tin phthalocyanine crystal, a hydroxy gallium phthalocyanine crystal, or an oxy-titanium phthalocyanine crystal as a charge transportation ingredient in this sensitization layer as charge transportability polyester according to claim 1 to 4 and a charge generating ingredient.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the organic electron device using new charge transportability polyester and new it, especially the photo conductor for electrophotography.

[0002]

[Description of the Prior Art] The charge transportability polymer represented by the polyvinyl carbazole (PVK) is promising as an organic electroluminescence-devices ingredient which was indicated by the photoconduction ingredient of the photo conductor for electrophotography, collection of 36th applied-physics relation union lecture meeting drafts 31 p-K -12 (1990), etc. Although both these ingredients make a layer form and are used as a charge transportation layer, as an ingredient which forms a charge transportation layer, the charge transportability polymer represented by PVK and the thing of the low-molecular dispersed system which distributed the low molecular weight compound of charge transportability in the polymer are known well. Moreover, it is common to vapor-deposit and use a low-molecular charge transportation ingredient as organic electroluminescence devices. Among these, the thing of a low-molecular dispersed system has the versatility of an ingredient, and it is in use with the photo conductor for electrophotography especially from a highly efficient thing being easy to be obtained.

[0003] Although used [ come ] also for a high-speed copying machine and a high-speed printer with high-performance-izing of an organic photo conductor in recent years about an electrophotography photo conductor, when using an organic photo conductor in a high-speed copying machine or a high-speed printer, the current engine performance is not necessarily enough and it is anxious for especially the further reinforcement. One of the important factors which determines the life of an organic photo conductor is wear of a surface layer. The current organic photo conductor has become in use [ the so-called laminating type which carried out the laminating of the charge transportation layer of thing ] on the charge generating layer, therefore a charge transportation layer turns into a surface layer in many cases. Although the thing of the engine performance which can fully be satisfied about an electric property was being obtained, since a low molecular weight compound was distributed and used for current and a mainstream low-molecular dispersed system charge transportation layer into binding resin, the mechanical engine performance of binding resin original fell, and they essentially had the fault of being weak, about wear. On the other hand, since the above-mentioned fault may be greatly improvable, the charge transportability polymer is studied briskly now. For example, the polycarbonate by the polymerization of specific dihydroxy arylamine and bis-chloro formate is indicated by the U.S. Pat. No. 4,806,443 specification, and the polycarbonate by the polymerization of specific dihydroxy arylamine and a phosgene is indicated at the U.S. Pat. No. 4,806,444 specification. Moreover, bis-hydroxyalkyl arylamine, bis-chloro formate, or the polycarbonate by the polymerization with a phosgene is indicated by the U.S. Pat. No. 4,801,517 specification, and the polycarbonate by the polymerization of specific dihydroxy arylamine or bis-hydroxyalkyl arylamine, and bis-chloro formate and the polyester by the polymerization with bis-acyl halide are indicated by the U.S. Pat. No. 4,937,165 specification and the

U.S. Pat. No. 4,959,288 specification. Furthermore, polyurethane is indicated for the polycarbonate and polyester of the arylamine which has a specific fluorene frame on U.S. Pat. No. 5,034,296 specifications by the U.S. Pat. No. 4,983,482 specification again. The polyester which used specific bis-styryl screw arylamine as the principal chain is indicated by JP,59-28903,B further again. Moreover, the photo conductor using the polymer and it which used the substituent of charge transportability, such as a hydrazone and a thoria reel amine, as the pendant is proposed by JP,61-20953,A, JP,1-134456,A, JP,1-134457,A, JP,1-134462,A, JP,4-133065,A, and JP,4-133066,A. Especially the polymer that has a tetra-aryl benzidine frame has high mobility, and its practicality is high as reported to "The Sixth International Congress - Advances in Non-impact Printing Technologies. 306" (1990).

[0004]

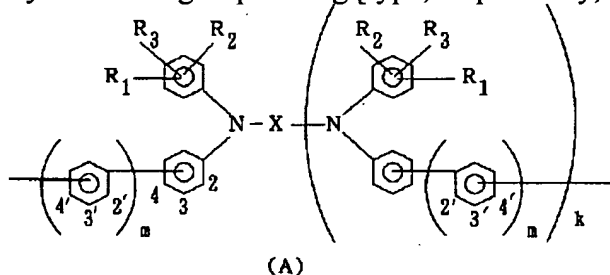
[Problem(s) to be Solved by the Invention] By the way, although various properties, such as matching of solubility, mobility, and oxidation potential, are required of a charge transportability polymer, in order to fill these demands, generally introducing a substituent and controlling physical properties is performed. Since most ionization potentials of a charge transportability polymer are determined by the charge transportability monomer, they become important [ that the ionization potential of a charge transportability monomer can be controlled ]. The monomer which is the raw material of the thoria reel amine polymer shown previously can be divided roughly into two sorts, \*\* dihydroxy arylamine and \*\* screw hydroxyalkyl arylamine. However, since dihydroxy arylamine has aminophenol structure, it tends to oxidize, and it is difficult to refine. Moreover, especially the thing for which it becomes much more unstable in the case of PARAHIDOROKISHI permutation structure, but the location of the substituent is changed and ionization potential is controlled is difficult. Furthermore, since it had the structure which direct oxygen permuted by the ring, it was easy to produce a bias in charge distribution by the electronic suction nature, and there was a trouble that mobility tends to fall. On the other hand, composition of a monomer of what is lost by the methylene group is difficult for bis-hydroxyalkyl arylamine. That is, since both bromine and iodine have reactivity when compounding by the reaction of diarylamine or a diaryl benzidine, and 3-BUROMO iodobenzene, a product tends to turn into mixture and decline in yield is imitated, and it is \*\*. Moreover, the alkyl lithium used in case a bromine compound is lithiated, and ethyleneoxide had the trouble that danger and toxicity were high and handling took cautions.

[0005] In order to solve this problem, this invention person etc. indicated the new high performance charge transportability polymer in JP,8-253568,A, JP,8-211640,A, JP,8-208820,A, and JP,9-110974,A, as a result of examining a charge transportability polymer wholeheartedly. A thing given in these official reports is the charge transportability polymer of the alternating copolymerization shown by the following general formula (III) or (IV).

$H-(O-Y)r-O[CO-A-CO-O-(Y-O)r]p-H$  (III)

$B-[CO-A-CO-O-(Y-O)r-CO-Z-CO-O-(Y-O)r]CO-A-CO-B'$  (IV)

A expresses the radical of bivalence shown by the following formula by Y and Z expressing a divalent hydrocarbon group among [type, respectively, and it is [Formula 2].



(R1, R2, and R3 show independently the aryl group which is not permuted [ a hydrogen atom, a halogen atom, an alkyl group, an alkoxy group, a permutation, or ], respectively, and X shows the divalent organic radical which is not permuted [ a permutation or ].) a, b, k, and m show the integer of 0 or 1, respectively, and T shows the divalent hydrocarbon group into which carbon numbers 1-10 may branch. B and B' is radical-O-(Y-O) r-H or radical-O-(Y-O) r-CO-Z-CO-OR' (it is here) independently,

respectively. R' expresses the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, an alkyl group, a permutation, or /, a permutation, or ], Y and Z express a divalent hydrocarbon group, respectively, and r expresses the integer of 1-5. r expresses the integer of 1-5 and p expresses the integer of 5-5000. ]

[0006] Although this charge transportability polymer showed the property which was excellent to the conventional thing and its practicality was high, it was not enough to the demand of the further improvement in the speed. As a result of examining this point, in the charge transportability polymer of alternating copolymerization shown by the above-mentioned general formula (III) and (IV), the part which bears charge transportation was only a part of the above-mentioned radical A, and in order that the ratio of a charge transportation functional division (part of Radical A) might decrease, it turned out that the demand of improvement in the speed cannot be coped with. That is, in low-molecular charge transportation material, it is known well that charge transportation ability will go up, and it is thought by raising the concentration of a charge transportation functional division also in a charge transportability polymer that advanced features are more possible as the concentration in a charge transportation layer increases. However, since control of the availability of a monomer it is unavailable in the raw material of a polymer or a polymerization method, and polymerization conditions was difficult, the polymer which included the charge transportation functional division even in the part equivalent to the radicals Y and B in a general formula (III) or (IV) and B' was not examined.

[0007] Therefore, the purpose of this invention has manufacture in offering the charge transportability polyester of easy and new high performance. Other purposes of this invention are to offer the organic electron device which used the charge transportability polyester, especially an electrophotography photo conductor.

[0008]

[Means for Solving the Problem] this invention person etc. by reduction of the monomer which has the substructure of a dicarboxylic acid component expressed with the following general formula (I) as a result of inquiring wholeheartedly to the above-mentioned trouble At least one or more sorts of the structure possible [ of the monomer which has the substructure of a diol component easily expressed with the following general formula (II) ] and expressing with the following general formula (I) using these monomers, By repeating at least one or more sorts of the structure expressed with the following general formula (II), and making it contain as a substructure of a unit, it found out that composition of highly efficient charge transportability polyester resin was possible, and this invention was completed.

[0009] Therefore, the charge transportability polyester of this invention is characterized by containing at least one or more sorts of the structure expressed with the following general formula (II) as at least one or more sorts and diol component of the structure expressed with the following general formula (I) as a substructure of a repeat unit, respectively as a dicarboxylic acid component, and, as for the weight average molecular weight, it is desirable that it is 10,000-300,000.

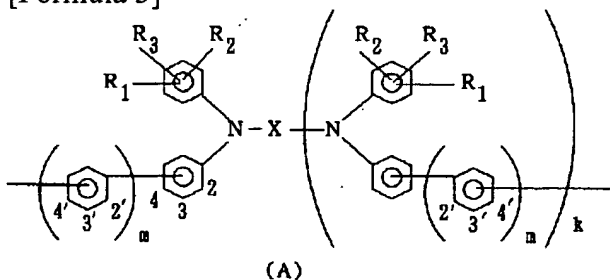
-CO-(T)a-A-(T)a-CO- (I)

- O-(T) b-A'-(T) b-O- (II)

A and A' shows among [type the radical of bivalence shown by the following formula, respectively.

[0010]

[Formula 3]



(R1, R2, and R3 show independently the aryl group which is not permuted [ a hydrogen atom, a halogen

atom, an alkyl group, an alkoxy group, a permutation, or ], respectively, and X shows the divalent organic radical which is not permuted [ a permutation or ].) a, b, k, and m show the integer of 0 or 1, respectively, and T shows the divalent hydrocarbon group into which carbon numbers 1-10 may branch.]

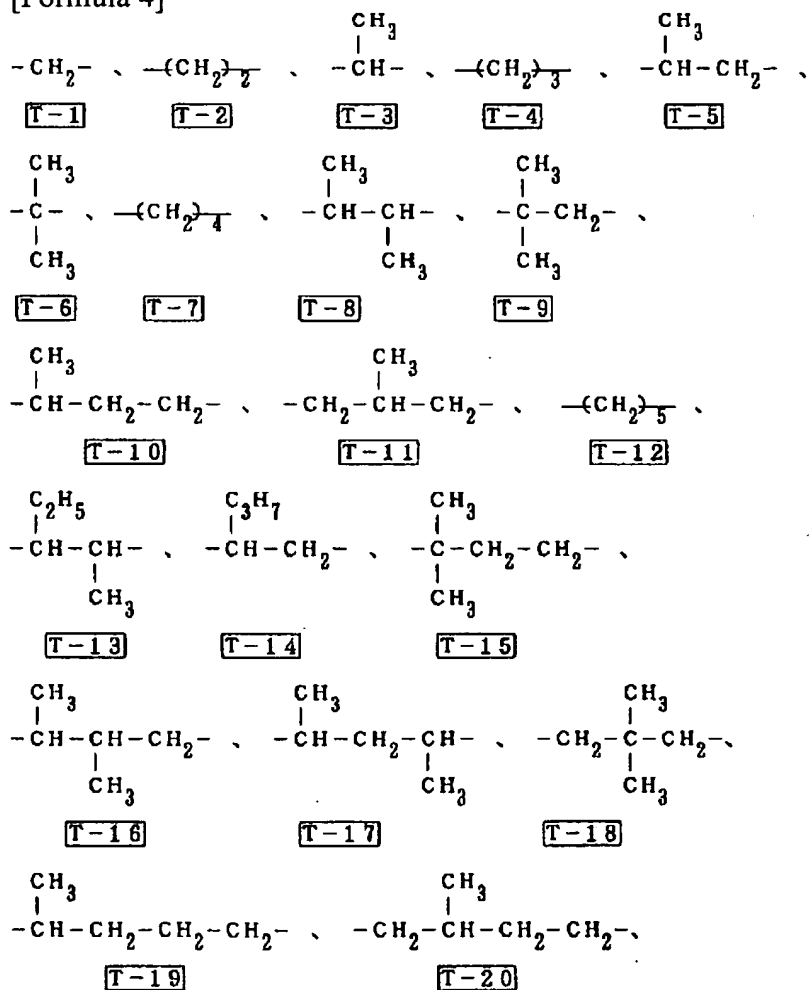
As for the organic electron device of this invention, it is desirable that it is the electrophotography photoconductor which has a sensitization layer by being characterized by containing the above-mentioned charge transportability polyester in the charge transportation functional film.

[0011]

[Embodiment of the Invention] In the above-mentioned general formula (I) and (II), the concrete example of structure of T is shown below. Although an arylamine frame may join together which side, when describing it as T-2r and describing it in the right-hand side of structure T-2 as T-2l. for example, it shall be shown that the arylamine frame has combined with the left-hand side of structure T-2.

[0012]

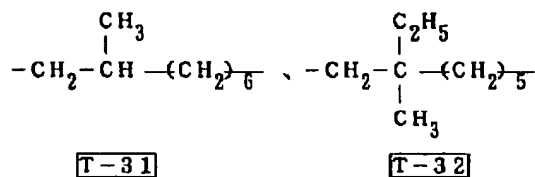
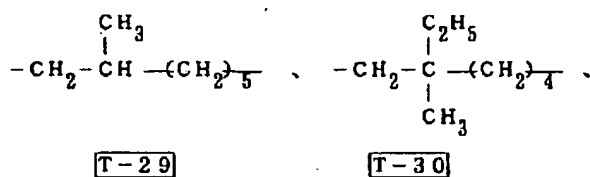
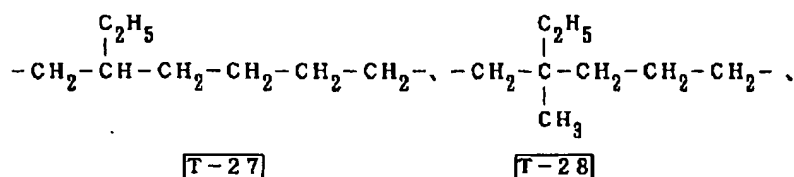
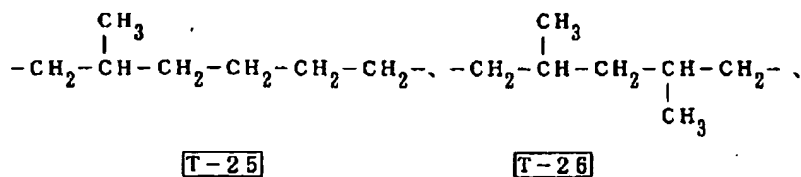
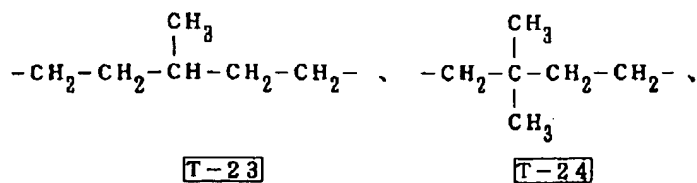
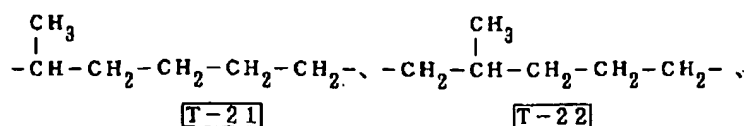
[Formula 4]



[0013]

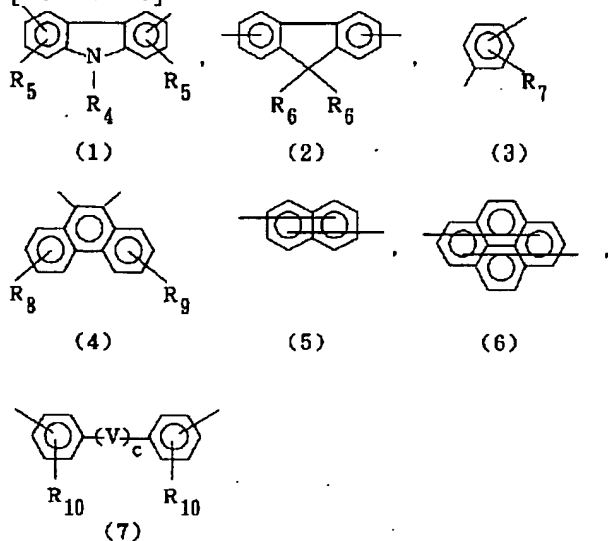
[Formula 5]





[0014] As a radical X, what was chosen from following radical (1) - (7) is raised.

[Formula 6]

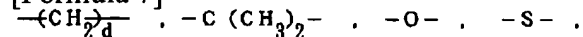


[0015] R4 expresses among [type the aralkyl radical which is not permuted [ the phenyl group which is

not permuted / a hydrogen atom, the alkyl group of carbon numbers 1-4, a permutation, or /, a permutation, or ], R5 -R10 express the aralkyl radical which is not permuted [ the phenyl group which is not permuted / a hydrogen atom, the alkyl group of carbon numbers 1-4, the alkoxy group of carbon numbers 1-4, a permutation, or /, a permutation, or ], and a halogen atom, and c means 0 or 1. Moreover, Radical V shows what was chosen from following radical (8) - (17).

[0016]

[Formula 7]



(8)

(9)

(10)

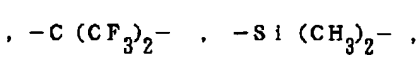
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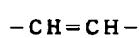


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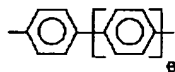


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



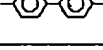


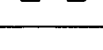
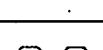
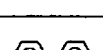
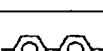

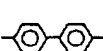
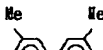

(17)

(d means the integer of 1-10 among a formula, and e means the integer of 1-3.)]

[0017] Although the example of the structure shown by the above-mentioned general formula (I) and (II) is shown in Table 1 - 7 and 8 - 14, respectively, the polyester in this invention is not limited by them.

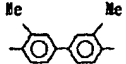
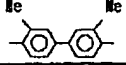
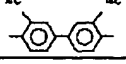
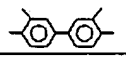
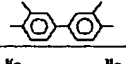
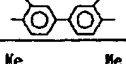
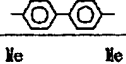
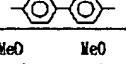
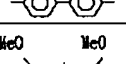
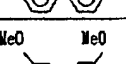
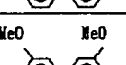
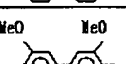
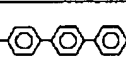
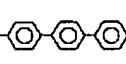

(Example of a general formula (I))

[Table 1]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
I-1		H	H	H	3	0	1	0	T-2
I-2		H	H	4-Ph	4	0	1	0	T-2
I-3		3-Me	4-Me	H	3	0	1	0	T-2
I-4		3-Me	4-Me	H	4	0	1	0	T-2
I-5		H	H	H	3	1	0	0	none
I-6		H	H	H	3	1	1	0	T-2
I-7		H	H	H	3	1	1	0	T-5 i
I-8		H	H	4-Me	3	1	1	0	T-2
I-9		H	H	4-Ph	3	1	1	0	T-2
I-10		3-Me	4-Me	H	3	1	1	0	T-8 i
I-11		3-Me	4-Me	H	3	1	1	0	T-25 i
I-12		H	H	H	4	1	1	0	T-5 r
I-13		H	H	H	4	1	1	0	T-1
I-14		H	H	H	4	1	1	0	T-2
I-15		3-Me	4-Me	H	3	1	0	0	none








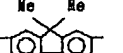
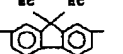
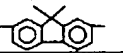
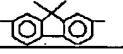
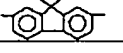
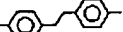
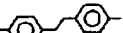
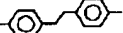
[0018]

[Table 2]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
1-15		H	H	H	3	1	1	0	T-2
1-17		H	4-Me	H	3	1	1	0	T-2
1-18		3-Me	4-Me	H	4	1	1	0	T-1
1-19		3-Me	4-Me	H	4	1	1	0	T-2
1-20		3-Me	4-Me	H	4	1	1	0	T-4
1-21		3-Me	5-Me	H	4	1	1	0	T-2
1-22		H	4-OMe	H	4	1	1	0	T-2
1-23		H	4-Me	H	4	1	1	0	T-131
1-24		H	H	H	3	1	0	0	none
1-25		H	H	H	3	1	1	0	T-2
1-26		H	4-Me	H	3	1	1	0	T-2
1-27		H	4-Ph	H	3	1	1	0	T-2
1-28		3-Me	4-Me	H	3	1	1	0	T-81
1-29		H	4-Me	H	3	1	1	0	T-2
1-30		H	4-Me	H	4	1	1	0	T-2

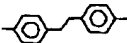




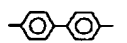
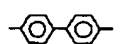
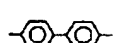
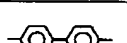
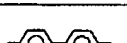
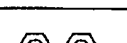
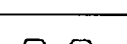
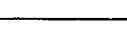
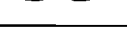
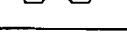
[0019]

[Table 3]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
I-31		3-Me	4-Me	H	4	1	1	0	T-2
I-32		3-Me	5-Me	H	4	1	1	0	T-2
I-33		H	H	H	3	1	1	0	T-2
I-34		H	4-Me	H	3	1	1	0	T-81
I-35		3-Me	4-Me	H	3	1	1	0	T-181
I-36		H	H	H	4	1	1	0	T-201
I-37		H	4-Me	H	4	1	1	0	T-241
I-38		H	H	H	3	1	1	0	T-2
I-39		H	4-Me	H	3	1	1	0	T-81
I-40		3-Me	4-Me	H	3	1	1	0	T-181
I-41		H	H	H	4	1	1	0	T-201
I-42		H	4-Me	H	4	1	1	0	T-241
I-43		H	H	H	3	1	1	0	T-2
I-44		H	4-Ph	H	4	1	1	0	T-2
I-45		H	4-Ph	H	4	1	1	0	T-51

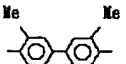
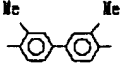
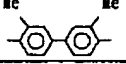
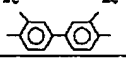
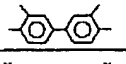
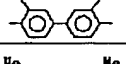
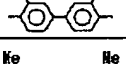
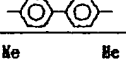
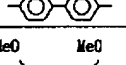
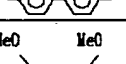
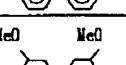
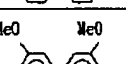
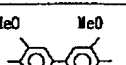
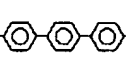

[0020]

[Table 4]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
I-46		2-Me	4-Me	6-Me	4	1	1	0	T-2
I-47		H	H	H	4,4'	0	1	1	T-2
I-48		H	H	H	4,4'	0	1	1	T-2
I-49		3-Me	4-Me	H	4,4'	0	1	1	T-2
I-50		3-Me	4-Me	H	4,4'	0	1	1	T-2
I-51		H	H	H	4,4'	1	0	1	none
I-52		H	H	H	4,4'	1	1	1	T-2
I-53		H	H	H	4,4'	1	1	1	T-51
I-54		H	H	4-Me	4,4'	1	1	1	T-2
I-55		H	H	4-Ph	4,4'	1	1	1	T-2
I-56		3-Me	4-Me	H	4,4'	1	1	1	T-81
I-57		3-Me	4-Me	H	4,4'	1	1	1	T-251
I-58		H	H	H	4,4'	1	1	1	T-5r
I-59		H	H	H	4,4'	1	1	1	T-1
I-60		H	H	H	4,4'	1	1	1	T-2









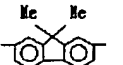
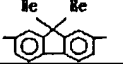
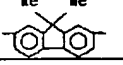
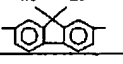
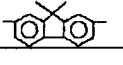
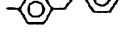
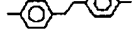
[0021]

[Table 5]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
I-61		3-Me	4-Me	H	4,4'	1	0	1	none
I-62		H	H	H	4,4'	1	1	1	T-2
I-63		H	4-Me	H	4,4'	1	1	1	T-2
I-64		3-Me	4-Me	H	4,4'	1	1	1	T-1
I-65		3-Me	4-Me	H	4,4'	1	1	1	T-2
I-66		3-Me	4-Me	H	4,4'	1	1	1	T-4
I-67		3-Me	5-Me	H	4,4'	1	1	1	T-2
I-68		H	4-OMe	H	4,4'	1	1	1	T-2
I-69		H	4-Me	H	4,4'	1	1	1	T-131
I-70		H	H	H	4,4'	1	0	1	none
I-71		H	H	H	4,4'	1	1	1	T-2
I-72		H	4-Me	H	4,4'	1	1	1	T-2
I-73		H	4-Ph	H	4,4'	1	1	1	T-2
I-74		3-Me	4-Me	H	4,4'	1	1	1	T-81
I-75		H	4-Me	H	4,4'	1	1	1	T-2

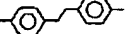
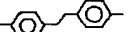
[0022]

[Table 6]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
I-76		H	4-Me	H	4,4'	1	1	1	T-2
I-77		3-Me	4-Me	H	4,4'	1	1	1	T-2
I-78		3-Me	5-Me	H	4,4'	1	1	1	T-2
I-79		H	H	H	4,4'	1	1	1	T-2
I-80		H	4-Me	H	4,4'	1	1	1	T-81
I-81		3-Me	4-Me	H	4,4'	1	1	1	T-181
I-82		H	H	H	4,4'	1	1	1	T-201
I-83		H	4-Me	H	4,4'	1	1	1	T-241
I-84		H	H	H	4,4'	1	1	1	T-2
I-85		H	4-Me	H	4,4'	1	1	1	T-81
I-86		3-Me	4-Me	H	4,4'	1	1	1	T-181
I-87		H	H	H	4,4'	1	1	1	T-201
I-88		H	4-Me	H	4,4'	1	1	1	T-241
I-89		H	H	H	4,4'	1	1	1	T-2
I-90		H	4-Ph	H	4,4'	1	1	1	T-2

[0023]





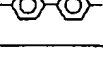

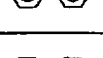
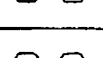
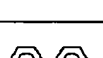
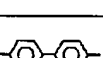
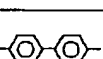
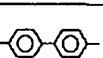
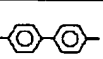
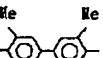
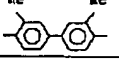
[Table 7]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	a	m	T
I-91		H	4-Ph	H	4,4'	1	1	1	T-51
I-92		2-Me	4-Me	6-Me	4,4'	1	1	1	T-2

&lt;BR&gt; [0024] (Example of a general formula (II))

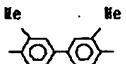
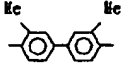
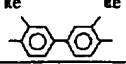
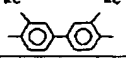
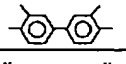
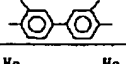
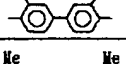
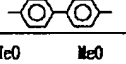
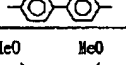
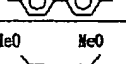
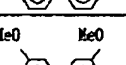
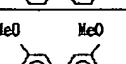
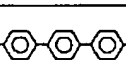
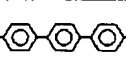

[Table 8]



	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	b	m	T
II-1		H	H	H	3	0	1	0	T-4
II-2		H	H	H	3	0	1	0	T-4
II-3		3-Me	4-Me	H	8	0	1	0	T-4
II-4		3-Me	4-Me	H	4	0	1	0	T-4
II-5		H	H	H	3	1	0	0	none
II-6		H	H	H	3	1	1	0	T-4
II-7		H	H	H	3	1	1	0	T-7
II-8		H	H	4-Me	3	1	1	0	T-4
II-9		H	H	4-Ph	3	1	1	0	T-4
II-10		3-Me	4-Me	H	3	1	1	0	T-12
II-11		3-Me	4-Me	H	3	1	1	0	T-7
II-12		H	H	H	4	1	1	0	T-7
II-13		H	H	H	4	1	1	0	T-2
II-14		H	H	H	4	1	1	0	T-4
II-15		3-Me	4-Me	H	3	1	0	0	none








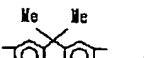
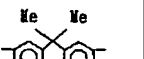
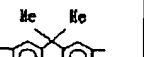
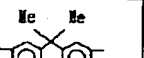
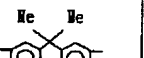
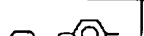
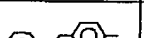

[0025]

[Table 9]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合 位置	k	b	m	T
II-16		H	H	H	3	1	1	0	T-4
II-17		H	4-Me	H	3	1	1	0	T-4
II-18		3-Me	4-Me	H	4	1	1	0	T-2
II-19		3-Me	4-Me	H	4	1	1	0	T-4
II-20		3-Me	4-Me	H	4	1	1	0	T-7
II-21		3-Me	5-Me	H	4	1	1	0	T-4
II-22		H	4-OMe	H	4	1	1	0	T-4
II-23		H	4-Me	H	4	1	1	0	T-12
II-24		H	H	H	3	1	0	0	none
II-25		H	H	H	3	1	1	0	T-4
II-26		H	4-Me	H	3	1	1	0	T-4
II-27		H	4-Ph	H	3	1	1	0	T-4
II-28		3-Me	4-Me	H	3	1	1	0	T-7
II-29		H	4-Me	H	3	1	1	0	T-4
II-30		H	4-Me	H	4	1	1	0	T-4

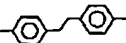




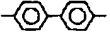
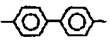
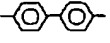
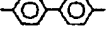
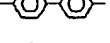

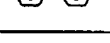
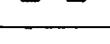
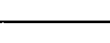
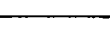
[0026]

[Table 10]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	b	m	T
II-31		3-Me	4-Me	H	4	1	1	0	T-4
II-32		3-Me	5-Me	H	4	1	1	0	T-4
II-33		H	H	H	3	1	1	0	T-4
II-34		H	4-Me	H	3	1	1	0	T-7
II-35		3-Me	4-Me	H	3	1	1	0	T-12
II-36		H	H	H	4	1	1	0	T-12
II-37		H	4-Me	H	4	1	1	0	T-12
II-38		H	H	H	3	1	1	0	T-4
II-39		H	4-Me	H	3	1	1	0	T-7
II-40		3-Me	4-Me	H	3	1	1	0	T-12
II-41		H	H	H	4	1	1	0	T-12
II-42		H	4-Me	H	4	1	1	0	T-12
II-43		H	H	H	3	1	1	0	T-4
II-44		H	4-Ph	H	4	1	1	0	T-4
II-45		H	4-Ph	H	4	1	1	0	T-7

[0027]

[Table 11]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	b	m	T
II-46		2-Me	4-Me	6-Me	4	1	1	0	T-4
II-47		H	H	H	4,4'	0	1	1	T-4
II-48		H	H	H	4,4'	0	1	1	T-4
II-49		3-Me	4-Me	H	4,4'	0	1	1	T-4
II-50		3-Me	4-Me	H	4,4'	0	1	1	T-4
II-51		H	H	H	4,4'	1	0	1	none
II-52		H	H	H	4,4'	1	1	1	T-2
II-53		H	H	H	4,4'	1	1	1	T-7
II-54		H	H	4-Me	4,4'	1	1	1	T-4
II-55		H	H	4-Ph	4,4'	1	1	1	T-4
II-56		3-Me	4-Me	H	4,4'	1	1	1	T-12
II-57		3-Me	4-Me	H	4,4'	1	1	1	T-7
II-58		H	H	H	4,4'	1	1	1	T-7
II-59		H	H	H	4,4'	1	1	1	T-2
II-60		H	H	H	4,4'	1	1	1	T-4

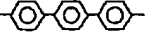
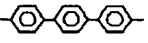
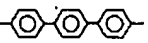





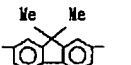
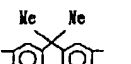
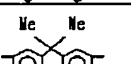
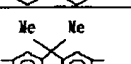
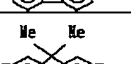
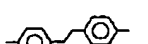
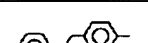
[0028]

[Table 12]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	b	m	T
II-61		3-Me	4-Me	H	4,4'	1	0	1	none
II-62		H	H	H	4,4'	1	1	1	T-4
II-63		H	4-Me	H	4,4'	1	1	1	T-4
II-64		3-Me	4-Me	H	4,4'	1	1	1	T-2
II-65		3-Me	4-Me	H	4,4'	1	1	1	T-4
II-66		3-Me	4-Me	H	4,4'	1	1	1	T-7
II-67		3-Me	5-Me	H	4,4'	1	1	1	T-4
II-68		H	4-OMe	H	4,4'	1	1	1	T-4
II-69		H	4-Me	H	4,4'	1	1	1	T-12
II-70		H	H	H	4,4'	1	0	1	none
II-71		H	H	H	4,4'	1	1	1	T-4
II-72		H	4-Me	H	4,4'	1	1	1	T-4
II-73		H	4-Ph	H	4,4'	1	1	1	T-4
II-74		3-Me	4-Me	H	4,4'	1	1	1	T-7
II-75		H	4-Me	H	4,4'	1	1	1	T-4

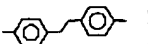
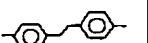
[0029]

[Table 13]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	b	m	T
II-76		H	4-Me	H	4,4'	1	1	1	T-4
II-77		3-Me	4-Me	H	4,4'	1	1	1	T-4
II-78		3-Me	5-Me	H	4,4'	1	1	1	T-4
II-79		H	H	H	4,4'	1	1	1	T-4
II-80		H	4-Me	H	4,4'	1	1	1	T-7
II-81		3-Me	4-Me	H	4,4'	1	1	1	T-12
II-82		H	H	H	4,4'	1	1	1	T-12
II-83		H	4-Me	H	4,4'	1	1	1	T-12
II-84		H	H	H	4,4'	1	1	1	T-4
II-85		H	4-Me	H	4,4'	1	1	1	T-7
II-86		3-Me	4-Me	H	4,4'	1	1	1	T-12
II-87		H	H	H	4,4'	1	1	1	T-12
II-88		H	4-Me	H	4,4'	1	1	1	T-12
II-89		H	H	H	4,4'	1	1	1	T-4
II-90		H	4-Ph	H	4,4'	1	1	1	T-4

[0030]

[Table 14]

	X	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	結合位置	k	b	m	T
II-91		H	4-Ph	H	4,4'	1	1	1	T-7
II-92		2-Me	4-Me	6-Me	4,4'	1	1	1	T-4

[0031] The monomer used as the dicarboxylic acid component used for manufacture of the above-mentioned charge transportability polymer of this invention can make arylamine or a diaryl benzidine, and halogenation carboalkoxy alkylbenzene able to react, and can be compounded easily. Furthermore, a diol component can compound the monomer used as the obtained dicarboxylic acid component by returning using lithium hydride aluminum, a sodium borohydride, etc.

[0032] About composition of the charge transportation ingredient which has an alkylene carboxylate radical, after introducing a chloro methyl group into JP,5-80550,A, the approach of forming a

GURINIYA reagent with Mg and esterifying after changing into a carboxylic acid with a carbon dioxide is indicated. However, by this approach, since the reactivity of a chloro methyl group is high, it cannot introduce from the phase in early stages of a raw material. Therefore, in a raw material phase, a non-permuted thing is used, and after chloromethylating directly, or introducing a formyl group, returning and considering as a hydroxymethyl group, it is necessary for the methyl group introduced in the phase in early stages of a raw material after forming frames, such as a thoria reel amine or a tetra-aryl benzidine, to be changed into a chloro methyl group, or to change into a chloro methyl group by a thionyl chloride etc. However, the charge transportation ingredient which has frames, such as a thoria reel amine and a tetra-aryl benzidine, cannot change into a chloro methyl group substantially the methyl group which the substitution reaction to a ring tended to occur since reactivity is very high, therefore was introduced. Moreover, in a raw material phase, a non-permuted thing is used and a chloro methyl group can be introduced only into the para position to a nitrogen atom by the approach of chloromethylating directly. Moreover, after introducing a formyl group, the approach of leading to a chloro methyl group has the problem that a reaction process is long. On the other hand, the method of making arylamine or a diaryl benzidine, and halogenation carboalkoxy alkylbenzene react, and obtaining a monomer changes the location of a substituent, and it is the approach excellent in the point of being easy to control ionization potential, and it enables control of the ionization potential of a charge transportability polymer. The charge transportability monomer used for this invention can introduce various substituents easily, since it is chemically stable, handling is easy and the above-mentioned trouble is improved.

[0033] The charge transportability polyester resin of this invention is compoundable by carrying out a polymerization by the approach indicated by the 28 4th edition experimental science lectures etc., using at least one or more sorts of the monomer expressed with at least one or more sorts and the following general formula (VI) of the monomer expressed with the following general formula (V). When compounding using two or more monomers, for reaction control of a polymerization, and giant-molecule quantification, it is desirable to make the functional group the same, respectively in all the monomers that have the substructure of a dicarboxylic acid component, and all the monomers that have the substructure of a diol component. For example, if a functional group is a methyl ester radical, it is desirable to use that in which all monomers have a methyl ester radical.

[0034]

E-CO-(T)a-A-(T)a-CO-E (V)

HO-(T) b-A'-(T) b-OH (VI)

A, A', and T, a and b have among [type the thing and this meaning which were described above, respectively, and E expresses hydroxyl-group, halogen atom, or radical-O-R11. (However, R11 expresses the aryl group which is not permuted [ an alkyl group, a permutation, or ] or an aralkyl radical.)]

[0035] Next, composition of the charge transportability polyester of this invention is described. Charge transportability polyester may be compounded only from the monomer shown by the monomer shown by the above-mentioned general formula (V), and the general formula (VI), and, as occasion demands, the monomer which does not have charge transportation components other than the monomer shown by the above-mentioned general formula (V) and (VI) can also be mixed and used for it for amelioration, such as flexibility and reinforcement. What is shown by the following formula can be raised as a monomer which does not have a charge transportation component. E-CO-R12-CO-E (VII)  
HO-R13-OH (VIII)

(E has the above mentioned thing and this meaning among a formula, R12 expresses an alkylene group or the aromatic series radical of bivalence, and R13 expresses the alkylene group which may be combined through an oxygen atom, or the aromatic series radical of bivalence.)

When using these monomers, the following structure will be included in the substructure of a repeat unit. When using those monomers, the content has 50 or less desirable % of the weight, and its 30 or less % of the weight is more desirable.

[0036]

-CO-R12-CO- (IX)

-O-R13-O- (X)

As a dicarboxylic acid component, isophthalic acid, a terephthalic acid, adipic acids, those acid chlorides, and bis-methyl ester can be used, and, specifically, ethylene glycol, propylene glycol, a diethylene glycol, a bisphenol, etc. can be used as a diol component.

[0037] (1) When E is a hydroxyl group and E is a hydroxyl group, carry out equivalent mixing of a diol component monomer and the dicarboxylic acid component monomer mostly, and carry out a polymerization using an acid catalyst. what is used for the usual esterification reactions, such as a sulfuric acid, toluenesulfonic acid, and trifluoroacetic acid, as an acid catalyst -- it can be used -- the dicarboxylic acid component monomer 1 weight section -- receiving -- 1/10000 - 1 / 10 weight sections - - it is preferably used in the range of 1/1000 - the 1 / 50 weight sections. 1 weight section of the polymer which it is desirable to use water and the solvent in which azeotropy is possible in order to remove the water generated during a polymerization, and toluene, a chlorobenzene, 1-chloronaphthalene, etc. are effective, and is generated -- receiving -- the 1 - 100 weight section -- it is preferably used in the range of 2 - 50 weight section. Although reaction temperature can be set as arbitration, in order to remove the water generated during a polymerization, it is desirable to make it react in the boiling point of a solvent. [0038] When a solvent is not used, it is made to dissolve in the solvent which can dissolve after reaction termination. When a solvent is used, after dropping a reaction solution as it is into the poor solvent which neither alcohols, such as a methanol and ethanol, nor polyester, such as an acetone, can dissolve easily, depositing a charge transportability polymer and separating charge transportability polyester, it fully washes and is made to dry by water or the organic solvent. Furthermore, as long as it is required, it may be made to dissolve in a suitable organic solvent, and it may be dropped into a poor solvent, and the reprecipitation processing which deposits charge transportability polyester may be repeated. It is desirable to carry out with a mechanical stirrer etc. in the case of reprecipitation processing, agitating efficiently. 1 weight section of the polyester which generates the solvent in which charge transportability polyester is dissolved in the case of reprecipitation processing -- receiving -- the 1 - 100 weight section - - it is preferably used in the range of 2 - 50 weight section. moreover, 1 weight section of the polyester which generates a poor solvent -- receiving -- the 1 - 1000 weight section -- it is preferably used in the range of the 10 - 500 weight section.

[0039] (2) When E is a halogen and E is a halogen, carry out equivalent mixing of the diol component monomer mostly with a dicarboxylic acid component monomer, and carry out a polymerization using organic base nature catalysts, such as a pyridine or triethylamine. 1-10Eq of organic base nature catalysts is preferably used by 2-5Eq to 1Eq of a dicarboxylic acid component monomer. 1 weight section of the polyester which a methylene chloride, a tetrahydrofuran (THF), toluene, a chlorobenzene, 1-chloronaphthalene, etc. are effective, and generate as a solvent -- receiving -- the 1 - 100 weight section -- it is preferably used in the range of 2 - 50 weight section. Reaction temperature can be set as arbitration. After carrying out a polymerization, reprecipitation processing is carried out as mentioned above, and it refines.

[0040] Moreover, interfacial polymerization can also be used for the case of dihydric alcohol with high acidity, such as a bisphenol. That is, after adding a diol component monomer to water, adding the base more than the equivalent and making it dissolve, a polymerization can be carried out by adding the solution of a diol component monomer and the dicarboxylic acid component monomer of the equivalent, agitating violently. under the present circumstances, water -- the diol component monomer 1 weight section -- receiving -- the 1 - 1000 weight section -- it is preferably used in the range of the 2 - 500 weight section. As a solvent in which a dicarboxylic acid component monomer is dissolved, a methylene chloride, a dichloroethane, trichloroethane, toluene, a chlorobenzene, 1-chloronaphthalene, etc. are effective. In order to be able to set reaction temperature as arbitration and to promote a reaction, it is effective to use the phase transfer catalysis of ammonium salt, sulfonium salt, etc. phase transfer catalysis -- 1 weight section of a dicarboxylic acid component monomer -- receiving -- 0.1 - 10 weight section -- it is preferably used in the range of 0.2 - 5 weight section.

[0041] (3) Substantially [ a diol component monomer ], when E is -O-R11 and E is -O-R11, a



dicarboxylic acid component monomer and when the equivalent and a diol component monomer are volatility mostly, to a dicarboxylic acid component monomer, in the case of a non-volatile, the oxide of acetate, such as inorganic acids, such as a sulfuric acid and a phosphoric acid, a titanium alkoxide, calcium, and cobalt, or a carbonate, zinc, or lead can be used for a catalyst, and can be heated, and, in addition, it can compound by the ester interchange to it more than the equivalent. When a diol component monomer is volatility, 2-100Eq is preferably used by 3-50Eq to 1Eq of dicarboxylic acid component monomers. 1 weight section of the polyester which generates a catalyst -- receiving -- 1/10000 - 1 weight section -- it is preferably used in 1/1000 - 1 / 2 weight sections. In order to perform a reaction with the reaction temperature of 200-300 degrees C and to promote a polymerization, it is desirable 0.01 - 100mmHg extent and to make it decompress and react to 0.05 - 20mmHg preferably. Moreover, you may make it react using high boilers, such as 1-chloronaphthalene in which a diol component monomer and azeotropy are possible, removing a diol component monomer with azeotropy under ordinary pressure.

[0042] The approach of (3) is [ that it is easy to obtain the polyester of the amount of macromolecules ] the most desirable among these composition approaches. since the firm film is obtained and it is hard, and it is inferior to membrane formation nature when the polymerization degree p of charge transportability polyester is too low, the solubility to a solvent will become low if too high, and workability worsens, it uses in 5-500 -- having -- desirable -- 10-300 -- it is more preferably set as 15-100. moreover, weight average molecular weight (the GPC method: styrene conversion) -- 10,000 thru/or 300,000 -- desirable -- 15,000 thru/or 200,000 -- it is set as the range of 50,000-100,000 still more preferably. Furthermore, in the structure shown by Formula A and A', although the integer chosen from 0 or 1 is shown, since k cannot produce the bias of the charge distribution of the thing of 1 in a charge transportation component easily and high transportability is acquired, k is desirable.

[0043] The application to charge transportability polyester, an electrophotography photo conductor, or organic electroluminescence devices of this invention etc. is possible, and you may use it independently, and the insulating polymer in which it and compatibility are possible may be made to contain.

[0044] The thing of structure which specifically prepared the layer containing the above-mentioned charge transportability polyester on the base material is used as an organic electron device. As a typical thing of an organic electron device, the electrophotography photo conductor which has a sensitization layer is mentioned, and what contains the charge transportability polyester of this invention in the surface layer of an electrophotography photo conductor especially can be raised. Moreover, the charge transportability polyester of this invention, and the thing containing a well-known charge generating ingredient and the electrophotography photo conductor which includes a phthalocyanine compound crystal especially can be raised as a desirable thing as a charge transportation ingredient into a sensitization layer.

[0045] In the above-mentioned electrophotography photo conductor in this invention, as a phthalocyanine crystal used combining the above-mentioned charge transportability polyester The gallium halide phthalocyanine crystal currently indicated by JP,5-98181,A, The halogenation tin phthalocyanine crystal currently indicated by JP,5-140472,A and JP,5-140473,A, The hydroxy gallium phthalocyanine crystal currently indicated by JP,5-263007,A and JP,5-279591,A, The oxy-titanium phthalocyanine hydrate crystal currently indicated by JP,4-189873,A and JP,5-43813,A is raised, and the electrophotography photo conductor which excels [ high sensitivity / especially ] in repeat stability can be obtained by using them.

[0046] Moreover, the chloro gallium phthalocyanine crystal used for this invention can be manufactured by carrying out dry grinding of the chloro gallium phthalocyanine crystal manufactured by the well-known approach mechanically by an automatic mortar, a planetary mill, a vibration mill, CF mill, the roller mill, the sand mill, a kneader, etc., or performing wet-grinding processing after dry grinding using a ball mill, a mortar, a sand mill, a kneader, etc. with a solvent as indicated by JP,5-98181,A. The solvent used in the above-mentioned processing Aromatic series (toluene, chlorobenzene, etc.) amides and fatty alcohol (dimethylformamide, N-methyl pyrrolidone, etc.) (a methanol --) aliphatic series polyhydric alcohol (ethylene glycol --), such as ethanol and a butanol aromatic alcohol (benzyl alcohol -

-), such as a glycerol and a polyethylene glycol Ester (acetic ester, butyl acetate, etc.), such as phenethyl alcohol Ketones, dimethyl sulfoxide (an acetone, methyl ethyl ketone, etc.), ether, several more sorts of mixed stock (diethylether, tetrahydrofuran, etc.), and the mixed stock of water and these organic solvents are raised. The solvent used is preferably used in the range of the ten to 100 section the one to 200 section to a chloro gallium phthalocyanine. Processing temperature is preferably performed in 10-60 degrees C below the boiling point of 0 degree C - a solvent. Moreover, grinding assistants, such as salt and sodium sulfate, can also be used in the case of grinding. What is necessary is just to use a grinding assistant one to 10 times preferably 0.5 to 20 times to a pigment.

[0047] A dichlorotin phthalocyanine crystal can grind the dichlorotin phthalocyanine crystal manufactured by the well-known approach like the aforementioned chloro gallium phthalocyanine, and can obtain it by carrying out solvent processing as indicated by JP,5-140472,A and JP,5-140473,A.

[0048] A hydroxy gallium phthalocyanine crystal as indicated by JP,5-263007,A and JP,5-279591,A Hydrolysis in an acid or an alkaline solution or an acid pay sting is performed for the chloro gallium phthalocyanine crystal manufactured by the well-known approach. [ whether direct solvent processing is performed by compounding a hydroxy gallium phthalocyanine crystal, and ] Or after performing dry grinding processing, without performing wet-grinding processing for the hydroxy gallium phthalocyanine crystal obtained by composition using a ball mill, a mortar, a sand mill, a kneader, etc. with a solvent, or using a solvent, it can manufacture by carrying out solvent processing. As a solvent used in the above-mentioned processing aromatic series and amides (toluene, chlorobenzene, etc.) (dimethylformamide --) fatty alcohol (a methanol and ethanol --), such as N-methyl pyrrolidone aliphatic series polyhydric alcohol (ethylene glycol and a glycerol --), such as a butanol aromatic alcohol (benzyl alcohol --), such as a polyethylene glycol Ester (acetic ester, butyl acetate, etc.), such as phenethyl alcohol Ketones, dimethyl sulfoxide (an acetone, methyl ethyl ketone, etc.), ether, several more sorts of mixed stock (diethylether, tetrahydrofuran, etc.), the mixed stock of water and these organic solvents, etc. are raised. The solvent used is preferably used in the range of the ten to 100 section the one to 200 section to a hydroxy gallium phthalocyanine. 0-150 degrees C of processing temperature are preferably performed in room temperature -100 degree C. Moreover, grinding assistants, such as salt and sodium sulfate, can also be used in the case of grinding. A grinding assistant is preferably used in the 1 to 10 times as many range as this 0.5 to 20 times to a pigment.

[0049] An oxy-titanium phthalocyanine crystal as indicated by JP,4-189873,A and JP,5-43813,A [ whether the acid pay sting of the oxy-titanium phthalocyanine crystal manufactured by the well-known approach is carried out, and ] Or salt milling is performed with mineral salt using a ball mill, a mortar, a sand mill, a kneader, etc. after considering as the crystalline low oxy-titanium phthalocyanine crystal to which it has a peak in 27.2 in an X diffraction spectrum comparatively, or it performs direct solvent processing -- being certain -- it is -- It can manufacture by performing wet-grinding processing with a solvent using a ball mill, a mortar, a sand mill, a kneader, etc. As an acid used for an acid pay sting, a sulfuric acid is desirable, 70 - 100% of concentration, 95 - 100% of thing is used preferably, and -20-100 degrees C of melting temperatures are preferably set as the range of 0-60 degrees C. The amount of concentrated sulfuric acid is preferably set as the 3 to 50 times as many range as this one to 100 times to the weight of an oxy-titanium phthalocyanine crystal. As a solvent to deposit, the partially aromatic solvent of water or water, and an organic solvent is used in the amount of arbitration, and especially the partially aromatic solvent of alcohols solvents, such as water, a methanol, and ethanol, or water, and aromatic solvents, such as benzene and toluene, is desirable. Although there is especially no limit about the temperature to deposit, in order to prevent generation of heat, cooling on ice etc. is desirable. Moreover, the ratios of an oxy-titanium phthalocyanine crystal and mineral salt are 1 / 0.1 - 1/20 in a weight ratio, and its range of 1 / 0.5 - 1/5 is desirable. As a solvent used in the above-mentioned solvent processing, aromatic series, fatty alcohol (toluene, chlorobenzene, etc.), halogens (methanol, ethanol, butanol, etc.) system hydrocarbons, several more sorts of mixed stock (dichloromethane, chloroform, trichloroethane, etc.), the mixed stock of water and these organic solvents, etc. are raised. The solvent used is preferably used in the 5 to 50 times as many range as this one to 100 times to an oxy-titanium phthalocyanine. processing temperature -- room temperature - 100 degrees C is preferably set as the

range of 50-100 degrees C. What is necessary is just to use a grinding assistant one to 10 times preferably 0.5 to 20 times to a pigment.

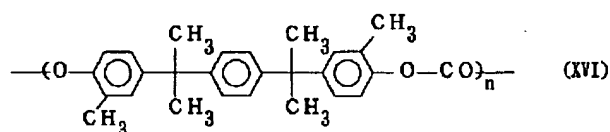
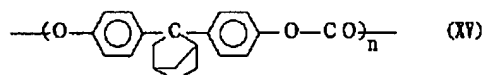
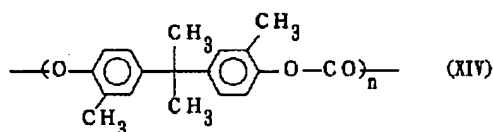
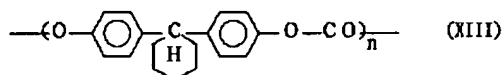
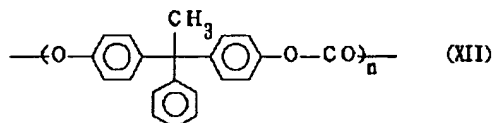
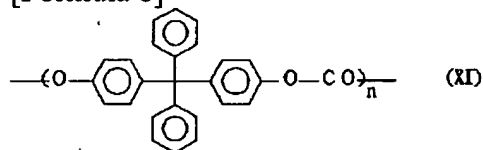
[0050] Next, an electrophotography photo conductor is explained. As a conductive base material, spreading or the infiltrated paper, plastic film, etc. are raised in electro-conductivity applying agents, such as plastic film which prepared thin films, such as metals, such as aluminum, nickel, chromium, and stainless steel, and aluminum, titanium, nickel, chromium, stainless steel, gold, vanadium, tin oxide, indium oxide, and ITO. Although these conductive base materials are used as a thing of proper configurations, such as the shape of the shape of the shape of a drum, and a sheet, and a plate, they are not limited to these. Furthermore, the front face of a conductive base material can perform various kinds of processings in the range which does not have effect in image quality if needed. For example, scattered reflection processings of graining etc., such as surface oxidation treatment and a surface chemical treatment, and coloring processing, can be performed. Moreover, an under-coating layer may be further prepared between a conductive base material and a charge generating layer. This under-coating layer shows an acid-resisting operation of the light of a conductive base material etc. depending on the operation as a glue line which carries out adhesion maintenance of the sensitization layer in one to a conductive base material, or the case while preventing impregnation of the charge to a sensitization layer from a conductive base material at the time of electrification of the sensitization layer which consists of a laminated structure.

[0051] As a binder used for this under-coating layer, polyethylene resin, polypropylene resin, Acrylic resin, methacrylic resin, polyamide resin, vinyl chloride resin, Vinyl acetate resin, phenol resin, polycarbonate resin, polyurethane resin, Polyimide resin, vinylidene chloride resin, polyvinyl-acetal resin, A vinyl chloride vinyl acetate copolymer, polyvinyl alcohol resin, water-soluble polyester resin, A nitrocellulose, casein, gelatin, polyglutamic acid, starch, Well-known ingredients, such as starch acetate, amino starch, polyacrylic acid, polyacrylamide, a zirconium chelate compound, a titanium chelate compound, a titanium alkoxide compound, an organic titanium compound, and a silane coupling agent, are raised. Moreover, 0.01-10-micrometer 0.05-2 micrometers are preferably suitable for the thickness of an under-coating layer. As the method of application used when preparing this under-coating layer furthermore, the usual approaches, such as a blade coating method, a MAIYA bar coating method, a spray coating method, a dip coating method, a bead coating method, the air-knife-coating method, and the curtain coating method, can be used.

[0052] The charge transportability polyester of this invention may be independently used for a charge transportation layer, and it may use it together with well-known binding resin and other well-known hydrazone system charge transportation ingredients, a thoria reel amine system charge transportation ingredient, a stilbene system charge transportation ingredient, etc. When using binding resin, specifically Polycarbonate resin, polyester resin, Methacrylic resin, acrylic resin, polyvinyl chloride resin, polyvinylidene chloride resin, Polystyrene resin, polyvinyl acetate resin, a styrene-butadiene copolymer, A vinylidene-chloride-acrylonitrile copolymer, a vinyl chloride vinyl acetate copolymer, A vinyl chloride-vinyl acetate-maleic-anhydride copolymer, silicon resin, Although well-known resin, such as a silicon-alkyd resin, phenol-formaldehyde resin, a styrene-alkyd resin, Polly N-vinylcarbazole, and polysilane, can be used, it is not limited to these. When the polycarbonate resin shown by following structure-expression (XI)- (XVI) among these binding resin and the polycarbonate resin to which copolymerization of them was carried out are used, compatibility is good, the uniform film is obtained and a good property is shown especially. a compounding ratio (weight ratio) -- charge transportability polyester: -- the range of binding resin =10:0-8:10 is desirable. Moreover, when mixing with other charge transportation ingredients, the range of charge transportability polyester + binding resin:charge transportation ingredient =10:0-10:8 is desirable. Moreover, 5-50-micrometer 10-40 micrometers are preferably suitable for the thickness of a charge transportation layer. As the method of application used when preparing this charge transportation layer furthermore, the usual approaches, such as a blade coating method, a MAIYA bar coating method, a spray coating method, a dip coating method, a bead coating method, the air-knife-coating method, and the curtain coating method, can be used.

[0053]

[Formula 8]



(The inside of a formula and n are polymerization degree, and are 50-3,000)

[0054] Although it is desirable to use the above mentioned phthalocyanine crystal for a charge generating layer as a charge generating ingredient, any well-known charge generating ingredients, such as a bis-azo pigment, a phthalocyanine pigment, a squarylium pigment, a perylene pigment, and dibromo anthanthrone, can be used.

[0055] It can choose from extensive insulating resin as binding resin used for a charge generating layer. Moreover, it can also choose from organic photoconductivity polyester, such as Polly N-vinylcarbazole, a polyvinyl anthracene, a polyvinyl pyrene, and polysilane. As desirable binding resin, although insulating resin, such as polyvinyl butyral resin, polyarylate resin (polycondensation object of bisphenol A and a phthalic acid etc.), polycarbonate resin, polyester resin, phenoxy resin, a vinyl chloride vinyl acetate copolymer, polyamide resin, acrylic resin, polyacrylamide resin, polyvinyl pyridine resin, cellulosic resin, urethane resin, an epoxy resin, casein, polyvinyl alcohol resin, and polyvinylpyrrolidone resin, can be raised, it is not limited to these. these binding resin is independent -- or two or more sorts can be mixed and it can use.

[0056] Moreover, the compounding ratio (weight ratio) of a charge generating ingredient and binding resin has the desirable range of 10:1-1:10. Moreover, as these approaches of distributing, the usual approaches, such as a ball mill variational method, an attritor variational method, and a sand mill variational method, can be used. It is still more effective in the case of this distribution to make preferably 0.5 micrometers or less of 0.3 micrometers or less of particles into the grain size of 0.15 micrometers or less still more preferably. moreover, independent [ in the usual organic solvents, such as a methanol, ethanol, n-propanol, n-butanol, benzyl alcohol, methyl Cellosolve, ethyl Cellosolve, an acetone, a methyl ethyl ketone, a cyclohexanone methyl acetate, n-butyl acetate, dioxane, a tetrahydrofuran a methylene chloride chloroform, chlorobenzene and toluene ] as a solvent used for these distributions -- or two or more sorts can be mixed and it can use. Moreover, 0.01-10-micrometer

0.05-5 micrometers are preferably suitable for the thickness of a charge generating layer. As the method of application used when preparing this charge generating layer furthermore, the usual approaches, such as a blade coating method, a MAIYA bar coating method, a spray coating method, a dip coating method, a bead coating method, the air-knife-coating method, and the curtain coating method, can be used.

[0057]

[Example] Hereafter, an example explains this invention. For example, the monomer used for manufacture of charge transportability polyester is the following, and can be made and compounded. Synthetic 3,4-xylidine 6g of 1 N of synthetic examples and N-bis(3-(2-(ethoxycarbonyl) ethyl) phenyl)-3,4-xylidine (a substructure is shown by (I-3) and both ends are ethyl ester), 3-iodine dihydrocinnamonic acid ethyl 34g, 19g of potassium carbonate, 5g of copper-sulfate 5 hydrates, and 20ml of n tridecane were put into the 1000ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 10 hours. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 500ml, insoluble matter was filtered, and the filtrate was generated in silica gel column chromatography using toluene. Oil-like N and 20g of N-bis(3-(2-(ethoxycarbonyl) ethyl) phenyl)-3,4-xylidine were obtained.

[0058] 2 N [ of synthetic examples ], N'-diphenyl-N, N'-bis(3-(2-(ethoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (I-6)) Both ends The composition N of ethyl ester, N'-diphenyl benzidine 10.77g, 3-iodine dihydrocinnamonic acid ethyl 23.0g, 11.61g of potassium carbonate, 1.0g of copper-sulfate 5 hydrates, and 20ml of n tridecane were put into the 100ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 1 hour. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 50ml, insoluble matter was filtered, and the filtrate was generated in silica gel column chromatography using toluene. 19.6g of oil-like N, N'-diphenyl-N, N'-bis(3-(2-(ethoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamines was obtained.

[0059] Synthetic example 33, 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (I-19)) Both ends Synthetic N-(3, 4-dimethylphenyl)-N-(4-(2-(methoxycarbonyl) ethyl) phenyl) amine 45g of methyl ester, 4 and 4'-diiodo -3 and 3'-dimethyl biphenyl 30g, 27g of potassium carbonate, 5g of copper-sulfate 5 hydrates, and 20ml of n tridecane were put into the 1000ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 5 hours. Cool to a room temperature after a reaction, make it dissolve in toluene 200ml, filter insoluble matter, refine a filtrate in silica gel column chromatography using toluene, and it recrystallizes [ partially aromatic solvent / ethyl acetate and / of ethanol ]. It was obtained 38g, having used 3 and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine as light yellow fine particles (the melting point is 161.5-163 degrees C).

[0060] Synthetic example 43, 3'-dimethyl-N, N'-bis(4-methoxyphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (I-22)) Both ends Synthetic N-(4-methoxyphenyl)-N-(4-(2-(methoxycarbonyl) ethyl) phenyl) amine 5.0g of methyl ester, 4 and 4'-diiodo -3 and 3'-dimethyl biphenyl 3.4g, 2.9g of potassium carbonate, 0.5g of copper-sulfate 5 hydrates, and 5ml of n tridecane were put into the 100ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 15 hours. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 20ml, insoluble matter was filtered, and the silica gel column chromatography refined the filtrate using toluene. Light yellow oil-like 3 and 3'-dimethyl-N, N'-bis(4-methoxyphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine 5.3g was obtained.

[0061] 5 Ns of synthetic examples, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-[1, 1':4', and 1''-terphenyl]-4, 4''-diamine (a substructure is shown by (I-31)) Both ends Synthetic N-(3, 4-dimethylphenyl)-N-(4-(2-(methoxycarbonyl) ethyl) phenyl) amine 5.0g of methyl ester, 4 or 4'' - diiodo-[1, 1':4', 1'' - terphenyl] 3.8g and 2.9g of potassium carbonate and 1.0g of copper-sulfate 5 hydrates, and 10ml of n tridecane were put into the 200ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 5 hours. Cool to a room temperature

after a reaction, make it dissolve in toluene 20ml, filter insoluble matter, refine a filtrate in silica gel column chromatography using toluene, and it recrystallizes [ acetone ]. N, N'-bis(3, 4-dimethylphenyl)-N, and N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl) - They were obtained 3.7g, having used [1, 1':4', and 1''-terphenyl]-4 and 4''-diamine as light yellow fine particles (the melting point is 146-147 degrees C).

[0062] Synthetic example 63, 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-methoxy carbonylmethyl) (phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (I-18)) Both ends Synthetic N-(3, 4-dimethylphenyl)-N-(4-(2-methoxy carbonylmethyl) phenyl) amine 9.0g of methyl ester, 4 and 4'-diiodo -3 and 3'-dimethyl biphenyl 6.2g, 5.5g of potassium carbonate, 1.0g of copper-sulfate 5 hydrates, and 10ml of n tridecane were put into the 200ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 5 hours. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 40ml, insoluble matter was filtered, and the silica gel column chromatography refined the filtrate using toluene. It recrystallized [ partially aromatic solvent / ethyl acetate and / of ethanol ], and 3 and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-methoxy carbonylmethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine 7.1g was obtained as light yellow fine particles (the melting point is 179-181 degrees C).

[0063] 7 N [ of synthetic examples ], N'-diphenyl-N, N'-bis(4-(4-(2-(ethoxycarbonyl) ethyl) phenyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (I-52)) Both ends The composition N of ethyl ester, N'-diphenyl benzidine 10.0g, 4-(2-(ethoxycarbonyl) ethyl)-4'-iodine biphenyl 24.0g, 11g of potassium carbonate, 1.0g of copper-sulfate 5 hydrates, and 30ml of n tridecane were put into the 200ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 1 hour. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 10ml, insoluble matter was filtered, and the filtrate was generated in silica gel column chromatography using toluene. 16.6g of oil-like N, N'-diphenyl-N, N'-bis(4-(4-(2-(ethoxycarbonyl) ethyl) phenyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamines was obtained.

[0064] 8 Ns of synthetic examples, an N-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-biphenyl-4-amine (a substructure is shown by (I-2)) Both ends The composition N of methyl ester, N-bis(4-(2-(methoxycarbonyl) ethyl) phenyl) amine 25.0g, 4-iodine biphenyl 20.5g, 12.0g of potassium carbonate, 1.0g of copper-sulfate 5 hydrates, and 30ml of n tridecane were put into the 200ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 3 hours. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 100ml, insoluble matter was filtered, and the filtrate was generated in silica gel column chromatography using toluene. It recrystallizes [ partially aromatic solvent / of an acetone and ethanol ], and is N and N-screw. (4-(2-(methoxycarbonyl) ethyl) phenyl) - biphenyl-4-amine 24.5g was obtained as light yellow fine particles (the melting point is 92-93 degrees C).

[0065] The synthetic example 91, 2-bis(4-(N-(4-(2-(methoxycarbonyl) ethyl) phenyl)-N-(4-phenyl phenyl) amino) phenyl) ethane (a substructure is shown by (I-44)) Both ends Synthetic N-(4-(2-(methoxycarbonyl) ethyl) phenyl)-N-(4-phenyl phenyl) amine 5.0g of methyl ester, 1 and 2-bis(4-iodine phenyl) ethane 3.0g, 2.1g of potassium carbonate, 0.2g of copper-sulfate 5 hydrates, and 10ml of n tridecane were put into the 100ml flask, and the pyrogenetic reaction was carried out at 230 degrees C under the nitrogen air current for 3 hours. Cooled to the room temperature after the reaction, it was made to dissolve in toluene 10ml, insoluble matter was filtered, and the filtrate was generated in silica gel column chromatography using toluene. It recrystallized [ partially aromatic solvent / of an acetone and ethanol ], and 1 and 2-bis(4-(N-(4-(2-(methoxycarbonyl) ethyl) phenyl)-N-(4-phenyl phenyl) amino) phenyl)-ethane 3.6g was obtained as light yellow fine particles (the melting point is 157-159 degrees C).

[0066] Synthetic example 103, 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-(hydroxyethyl) phenyl))-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (II-18)) 3 and 3'-dimethyl-N [ which both ends compounded in the example 6 of synthetic composition of a hydroxyl group ], N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-methoxy carbonylmethyl) (phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine 10.0g, Tetrahydrofuran 50ml was put in and dissolved in the 100ml flask,

and lithium hydride aluminum 1.2g was gradually added to this solution. After reaction termination, the refined precipitate was filtered, after adding a methanol and water and consuming superfluous lithium hydride aluminum. Water was further added to the filtrate, it extracted with toluene, and the toluene phase was fully rinsed. This was dried with the sodium sulfate, it recrystallized [ methanol / ethyl acetate and ], and 3 and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4- (2-(hydroxyethyl) phenyl))-[1 and 1'-biphenyl]-4, and 4'-diamine 7.0g was obtained (the melting point is 214-216 degrees C).

[0067] Synthetic example 113, 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4- (3-(hydroxypropyl) phenyl))-[1 and 1'-biphenyl]-4, and 4'-diamine (a substructure is shown by (II-19)) Both ends compounded in the example 3 of synthetic composition of a hydroxyl group. Except having used 3 and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine 10.0g 3 and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4- (3-(hydroxypropyl) phenyl))-[1 and 1'-biphenyl]-4, and 4'-diamine 7.2g was obtained like the synthetic example 10 (the melting point is 182-184 degrees C).

[0068] 12 N [ of synthetic examples ], N'-diphenyl-N, and N'-screw (4-(4-(2-(hydroxyethyl) phenyl) phenyl)-[1 and 1'-biphenyl]-4 and 4'-diamine (a substructure is shown by (II-52))) It is made to be the same as that of the synthetic example 10 except having used N and N'-diphenyl-N, N'-bis(4-(4-(2-(ethoxycarbonyl) ethyl) phenyl) phenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine 10.0g. [ which both ends compounded in the example 7 of synthetic composition of a hydroxyl group ] N, N'-diphenyl-N, and N'-screw (4-(4-(2-(hydroxyethyl) phenyl) phenyl)-[1 and 1'-biphenyl]-4 and 4'-diamine 6.5g was obtained (the melting point is 143-145 degrees C).

[0069] After putting in the synthetic example 131, the 3-diimino iso indoline 30 section, and the 3 gallium-chloride 9.1 section into the quinoline 230 section and making it react in 200 degrees C for 3 hours, the product was carried out the \*\* exception, the acetone and the methanol washed, and subsequently, after drying a \*\* cake, the chloro gallium phthalocyanine crystal 28 section was obtained. the chloro gallium phthalocyanine crystal 3 obtained section -- an automatic mortar (Lab-Mill UT- 21 molds) Dry grinding is carried out by the Yamato science company make for 3 hours. The 0.5 sections with the glass bead (1mmphi) 60 section Under a room temperature, After carrying out milling processing in the benzyl alcohol 20 section for 24 hours, carry out a glass bead a \*\* exception, and it washes and dries in the methanol 10 section. The chloro gallium phthalocyanine crystal which has  $2\theta^{*0.2 \text{ degree}} = 7.4 \text{ degree}$ , 16.6 degrees, 25.5 degrees, and a diffraction peak strong against 28.3 degrees by the powder X diffraction spectrum was obtained. This is set to CG-1.

[0070] synthetic example 14 phthalonitrile 50g and anhydrous salt-sized 2nd tin 27g -- 1-KURORU naphthalene 350ml -- after making it react [ be / it / under adding ] in 195 degrees C for 5 hours, the product was carried out the \*\* exception, 1-KURORU naphthalene, an acetone, a methanol, and after washing with water subsequently, reduced pressure drying was carried out and 18.3g of dichlorotin phthalocyanine crystals was obtained. After it put 5g of obtained dichlorotin phthalocyanine crystals into the pot made from agate with 10g [ of salt ], and agate ball (20mmphi) 500g and the planet mold ball mill (P-5 mold, product made from FURITCHU) ground them by 400rpm for 10 hours, it fully rinsed and dried. After carrying out milling processing of the 0.5g with THF15g and glass bead (1mmphi) 30g for bottom 24 hours of a room temperature, the glass bead was carried out the \*\* exception, it washed and dried with the methanol, and the dichlorotin phthalocyanine crystal which has  $2\theta^{*0.2 \text{ degree}} = 8.5 \text{ degree}$ , 11.2 degrees, 14.5 degrees, and a diffraction peak strong against 27.2 degrees by the powder X diffraction spectrum was obtained. This is set to CG-2.

[0071] After dissolving the chloro gallium phthalocyanine crystal 3 section obtained in the example 3 of synthetic example 15 composition at 0 degree C in the concentrated-sulfuric-acid 60 section, the above-mentioned solution was dropped at the distilled water 450 5-degree C section, and the crystal was re-deposited. After distilled water, rare aqueous ammonia, etc. washed, it dried and the hydroxy gallium phthalocyanine crystal of the 2.5 sections was obtained. After the automatic mortar ground this crystal for 5.5 hours, the hydroxy gallium phthalocyanine crystal which separates a crystal after 24-hour milling with the dimethylformamide 15 section and the glass bead 30 section with a diameter of 1mm, dries the 0.5 sections after washing with a methanol, and has  $2\theta^{*0.2 \text{ degree}} = 7.5 \text{ degree}$ , 9.9 degrees, 12.5



degrees, 16.3 degrees, 18.6 degrees, 25.1 degrees, and a diffraction peak strong against 28.3 degrees by the powder X diffraction spectrum was obtained. This is set to CG-3.

[0072] After putting in the synthetic example 161, the 3-diimino iso indoline 30 section, and the titanium tetra-butoxide 17 section into the 1-KURORU naphthalene 200 section and making it react in 190 degrees C for 5 hours under a nitrogen air current, the product was filtered, aqueous ammonia, water, and an acetone washed, and the oxy-titanium phthalocyanine 40 section was obtained. The oxy-titanium phthalocyanine crystal 5 section and the sodium chloride 10 section which were obtained were ground for 3 hours using the automatic mortar (Lab-MILL UT-21, product made from the Yamato science). Then, with distilled water, it fully washed, it dried, and the oxy-titanium phthalocyanine crystal of the 4.8 sections was obtained. The obtained oxy-titanium phthalocyanine crystal was what shows a clear peak to  $2\theta = 27.3$  degree by the powder X diffraction spectrum. After agitating the oxy-titanium phthalocyanine crystal 2 obtained section in 50 degrees C for 1 hour in the partially aromatic solvent of the distilled water 20 section and the monochlorobenzene 2 section, it filtered, and with the methanol, it washed enough, it dried, and the oxy-titanium phthalocyanine hydrate crystal which has a diffraction peak strong against  $2\theta = 27.3$  degree by the powder X diffraction spectrum was obtained. This is set to CG-4.

[0073] N and N-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-biphenyl-4-amine 6.0g compounded in the example 8 of example 1 composition (12.2mmol), 3 compounded 11 times in synthetic example, and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(3-(hydroxypropyl) phenyl))- [1 and 1'-biphenyl]-4, and 4'-diamine 8.37g (12.2mmol), Tetrabutoxytitanium 0.1g was put into the 100ml flask, and the temperature up was gradually carried out over 1 hour to 200 degrees C under the nitrogen air current. When generating of a methanol was completed, it decompressed to 1mmHg, and it reacted for further 2 hours. It cooled to the room temperature after reaction termination, and dissolved in 30ml of methylene chlorides, and insoluble matter was filtered. After adding 5ml of hydrochloric acids of 1-N to this solution and stirring violently for 30 minutes, it was dropped at the inside which carried out enough and has agitated isopropanol 200ml after rinsing, and the polymer was deposited. After filtering the obtained polymer and fully washing by isopropanol, it was made to dry and the 13.5g polymer was obtained. It was  $M_w = 5.05 \times 10^4$  when molecular weight was measured in GPC (styrene conversion). An IR spectrum is shown in drawing 1.

[0074] N and N-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-biphenyl-4-amine 6.0g compounded in the example 8 of example 2 composition, 3 compounded in synthetic example 11, and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(3-(hydroxypropyl) phenyl))- [1 and 1'-biphenyl]-4, and 4'-diamine 8.37g, 30ml of p-cylenes, Tetrabutoxytitanium 0.1g was put into the 100ml flask, and heating reflux was carried out under the nitrogen air current for 4 hours. It cooled to the room temperature after reaction termination, 30ml of methylene chlorides was added further, and insoluble matter was filtered. After adding 5ml of hydrochloric acids of 1-N to this solution and stirring violently for 30 minutes, it was dropped at the inside which carried out enough and has agitated isopropanol 300ml after rinsing, and the polymer was deposited. After filtering the obtained polymer and fully washing by isopropanol, it was made to dry and the 13.8g polymer was obtained. It was  $M_w = 7.05 \times 10^4$  when molecular weight was measured in GPC (styrene conversion). The IR spectrum was the same as that of drawing 1.

[0075] Instead of 3 N [ of examples ], and N-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-biphenyl-4-amine 6.0g Except having used 3 compounded in synthetic example 3, and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(2-(methoxycarbonyl) ethyl) phenyl))- [1 and 1'-biphenyl]-4, and 4'-diamine 9.06g The 15.4g polymer was obtained like the example 1. It was  $M_w = 1.36 \times 10^5$  when molecular weight was measured in GPC (styrene conversion). An IR spectrum is shown in drawing 2.

[0076] N and N-bis(4-(2-(methoxycarbonyl) ethyl) phenyl)-biphenyl-4-amine 6.0g compounded in the example 8 of example 4 composition, 3 compounded 11 times in synthetic example, and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-bis(4-(3-(hydroxypropyl) phenyl))- [1 and 1'-biphenyl]-4, and 4'-diamine 7.8g, Ethylene glycol 1.0g and tetrabutoxytitanium 0.1g were put into the 100ml flask, and the temperature up was gradually carried out over 1 hour to 200 degrees C under the nitrogen air current. Then, it decompressed to 1mmHg and 230 degrees C reacted for further 2 hours. It cooled to the room



temperature after reaction termination, and dissolved in 30ml of methylene chlorides, and insoluble matter was filtered. After adding 5ml of hydrochloric acids of 1-N to this solution, stirring violently for 30 minutes and fully rinsing, it was dropped at the inside which has agitated isopropanol 200ml, and the polymer was deposited. After filtering the obtained polymer and fully washing by isopropanol, it was made to dry and the 12.3g polymer was obtained. It was  $M_w=8.05 \times 10^4$  when molecular weight was measured in GPC (styrene conversion).

[0077] Combination of an example 5 - 15 dicarboxylic-acid ester, and diol was considered as the passage of Table 1, and the polymer was compounded like the example 1 except having used 12.2mmol (s) for dicarboxylic acid ester and diol, respectively. A result is shown in Table 15.

[0078]

[Table 15]

	ジカルボン酸エステル	ジオール	分子量 (スチレン換算)
実施例5	合成例 1	合成例10	$7.31 \times 10^4$
実施例6	合成例 1	合成例12	$6.33 \times 10^4$
実施例7	合成例 5	合成例12	$1.02 \times 10^5$
実施例8	合成例 9	合成例10	$2.65 \times 10^4$
実施例9	合成例 9	合成例11	$8.69 \times 10^4$
実施例10	合成例 7	合成例10	$6.58 \times 10^4$
実施例11	合成例 2	合成例10	$1.17 \times 10^5$
実施例12	合成例 7	合成例12	$1.09 \times 10^5$
実施例13	合成例 3	合成例10	$5.39 \times 10^4$
実施例14	合成例 6	合成例11	$8.39 \times 10^4$
実施例15	合成例 6	合成例12	$1.06 \times 10^5$

[0079] 3 compounded in example 3 of example of comparison 1 composition and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-screw [4-(2-methoxy carbonylethyl) phenyl]-[1 and 1'-biphenyl]-4, and 4'-diamine 15.0g, 3.0g [ of dimethyl terephthalates ], and ethylene glycol 30.0g and tetrabutoxytitanium 0.1g were put into the 300ml flask, and heating reflux was carried out under the nitrogen air current for 3 hours. After checking that 3 and 3'-dimethyl-N, N'-bis(3, 4-dimethylphenyl)-N, N'-screw [4-(2-methoxy carbonylethyl) phenyl]-[1 and 1'-biphenyl]-4, and 4'-diamine had been consumed, it heated at 235 degrees C, having decompressed to 0.5mmHg and distilling off ethylene glycol, and the reaction was continued for 2.5 hours. Then, it cooled to the room temperature, and dissolved in 200ml of methylene chlorides, insoluble matter was filtered, the filtrate was dropped at the inside which has agitated ethanol 1400ml, and the polymer was deposited. After filtering the obtained polymer and fully washing by ethanol, it was made to dry and the 17.0g polymer was obtained. It was  $M_w=1.40 \times 10^5$  when molecular weight was measured in GPC (styrene conversion).

[0080] The polymer was compounded like the example 1 of a comparison except having used dimethyl sebacate \*\* instead of example of comparison 2 dimethyl terephthalate.

The polymer was compounded like the example 1 of a comparison except having not added example of comparison 3 dimethyl terephthalate.

[0081] On the stainless steel cylinder substrate of 20mmphi which carried out the example 16 honing process, the solution which consists of the zirconium compound (trade name: ORUGACHIKKUSU ZC540, Matsumoto Pharmaceuticals company make) 100 section and the silane compound (trade name: A1110, made in Japanese YUN Karr) 10 section, the i-propanol 400 section, and the butanol 200 section was applied by the dip coating method, stoving was carried out for 10 minutes in 150 degrees C, and the under-coating layer of 0.5 micrometers of thickness was formed. After having mixed with the polyvinyl-butylal-resin (trade name: S lek BM-S, Sekisui Chemical Co., Ltd. make) 10 section and the n-butyl acetate 500 section, processing the ten sections of CG-1 with the paint shaker with the glass bead for 1

hour and distributing, the obtained coating liquid was applied by the dip coating method on the above-mentioned under-coating layer, and stoving was carried out for 10 minutes in 100 degrees C. The charge transportability polymer 5 section obtained in the example 1 was dissolved in the monochlorobenzene 38 section, the obtained coating liquid was applied by the dip coating method on the cylinder substrate made from stainless steel with which the charge generating layer was formed, and stoving and the charge transportation layer of 23 micrometers of thickness were formed in 120 degrees C for 1 hour.

[0082] Thus, the Fuji Xerox laser beam printer test model -1 (A-4 longitudinal direction, per minute 12 sheets) usually performed the print test for the electrophotographic properties of the obtained photo conductor for electrophotography under the environment (20 degrees C, 50%RH), and the image quality after the 1st sheet and a 2000-sheet copy was evaluated. The sensibility of a charge generating ingredient adjusted the quantity of light using the filter. The result is shown in Table 16.

[0083] The combination of examples 17-30, the example 4 of a comparison - 6 charge generating ingredient, and a charge transportability polymer was changed as shown in Table 16, and the photo conductor for electrophotography was produced and evaluated like the example 4. A result is shown in Table 16.

[0084]

[Table 16]

実施例	電荷輸送性 ポリマー	電荷発生 材料	画 質	
			1 枚目	2000枚目
実施例16	実施例1	CG-1	良 好	良 好
実施例17	実施例2	CG-1	良 好	良 好
実施例18	実施例3	CG-1	良 好	良 好
実施例19	実施例4	CG-1	良 好	良 好
実施例20	実施例3	CG-2	良 好	良 好
実施例21	実施例7	CG-2	良 好	良 好
実施例22	実施例10	CG-2	良 好	良 好
実施例23	実施例8	CG-4	良 好	良 好
実施例24	実施例9	CG-4	良 好	良 好
実施例25	実施例12	CG-4	良 好	良 好
実施例26	実施例1	CG-3	良 好	良 好
実施例27	実施例3	CG-3	良 好	良 好
実施例28	実施例8	CG-3	良 好	良 好
実施例29	実施例12	CG-3	良 好	良 好
実施例30	実施例15	CG-3	良 好	良 好
比較例4	比較例1	CG-3	画像にかす れが現れる	画 像 かすれ
比較例5	比較例2	CG-3	画像にかす れが現れる	画 像 かすれ
比較例6	比較例3	CG-3	良 好	画 像 かすれ

[0085]

[Effect of the Invention] It is the new matter, and the charge transportability polyester of this invention can be easily obtained as a polymer of the amount of giant molecules, and is an ingredient useful to organic electron devices, such as a photo conductor for electrophotography, so that clearly also from the result of the above-mentioned example. The electrophotography photo conductors using the charge transportability polyester of this invention are good sensibility and an outstanding thing which has stability repeatedly.

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[Translation done.]